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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,016	02/10/2004	Yoon-Jong Song	5649-1257	9795

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EXAMINER

TRAN, THIEN F

ART UNIT PAPER NUMBER

2811

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/775,016

Applicant(s)

SONG ET AL.

Examiner

Thien F. Tran

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 and 49-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-22 is/are allowed.
- 6) ☒ Claim(s) 23-30, 49 and 51 is/are rejected.
- 7) ☒ Claim(s) 50 and 52 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 23-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 recites the limitation "the capacitor-ferroelectric layer" in line 13. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 23-28, 49 and 51 are rejected under 35 U.S.C. 102(e) as being anticipated by Yoshikawa et al. (USPN 6,717,198).

Yoshikawa et al. discloses the claimed ferroelectric memory device (Figures 1-2), comprising: a semiconductor substrate 100 having a transistor; a lower portion of interlayer film 105 characterized as a first interlayer dielectric on the semiconductor substrate that surrounds a gate electrode 102 of the transistor (Fig. 2); a first capacitor

Art Unit: 2811

on the first interlayer dielectric, the first capacitor comprising a first bottom electrode 109 on the first interlayer dielectric, the first bottom electrode having a top surface and a plurality of side surfaces and a common top electrode 113; a second capacitor on the first interlayer dielectric, the second capacitor comprising a second bottom electrode 109 on the first interlayer dielectric and the common top electrode 113; a planarizing layer 111 adjacent to the side surfaces of the first bottom electrode, wherein a top surface of the planarizing layer and the top surface of the first bottom electrode form a planar surface and wherein a capacitor-ferroelectric layer 112 is on the planar surface (see Fig. 1); and a plug 106 that penetrates the first interlayer dielectric under the first bottom electrode, wherein the plug is electrically connect to the first bottom electrode; and wherein the first and second capacitors further comprise a shared capacitor-ferroelectric layer 112 that is between the first bottom electrode 109 and the common top electrode 113 and that is further between the second bottom electrode 109 and the common top electrode 113, the shared capacitor-ferroelectric layer 112 comprising a continuous layer that extends from the first capacitor to the second capacitor.

Regarding claim 24, the planarizing layer 111 comprises a reaction buffer layer.

Regarding claim 25, Yoshikawa et al. further discloses the device comprising a third interlayer dielectric (an upper portion of film 105) on the first interlayer dielectric (a lower portion of film 105) and under the reaction buffer layer 111, and wherein the reaction buffer layer comprises a material that prevents a reaction between the third interlayer dielectric and the capacitor-ferroelectric layer.

Regarding claim 26, the reaction buffer layer comprises a material (titanium oxide or aluminum oxide).

Regarding claims 27-28, the first bottom electrode 109 is made from the multilayer film of iridium film, iridium oxide film and platinum film wherein the iridium film inherently serves as an oxygen diffusion barrier, the iridium oxide inherently provides the capacitor-ferroelectric layer with oxygen, and the platinum film inherently has a lattice point that allows for formation of a capacitor-ferroelectric layer having a crystalline structure.

Regarding claim 49, Yoshikawa et al. discloses the claimed ferroelectric memory device (Fig. 2) comprising a semiconductor substrate 100 having a transistor; a first interlayer dielectric 105 on the semiconductor substrate; a plug 106 penetrating the first interlayer dielectric; a capacitor electrically connected to the plug, the capacitor having a bottom electrode 109 that has a top surface and a plurality of side surfaces, a capacitor-ferroelectric layer 112 and a top electrode 113; and a third interlayer dielectric layer 116 on the first interlayer dielectric and on at least one of the side surfaces of the bottom electrode 109; a reaction buffer layer 111 between the third interlayer dielectric and the capacitor-ferroelectric layer (see attached drawing of Fig. 2).

Regarding claim 51, Figure 1 shows the capacitor-ferroelectric layer 112 comprises a continuous layer that acts as a dielectric layer for at least the capacitor and a second capacitor.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. (USPN 6,717,198) in view of Gilbert et al. (USPN 6,709,875).

Yoshikawa et al. as described above does not specifically disclose the top electrode 113 comprising iridium oxide as a fourth material and iridium as a fifth material. Gilbert et al. discloses a top electrode 16 of a ferroelectric capacitor comprising iridium oxide and iridium conductive layers. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the top electrode 113 comprising iridium oxide as a fourth material and iridium as a fifth material as taught by Gilbert et al. in order to absorb oxygen without impairing the conductivity of the top electrode.

Regarding claim 29, the fourth material of iridium oxide in top electrode 113 inherently provides the ferroelectric layer with oxygen and the fifth material of iridium inherently improves the strength of the fourth material.

Response to Arguments

Applicant's arguments with respect to claims 23-30, 49 and 51 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

Claims 1-22 are allowed.

Art Unit: 2811

Claims 50 and 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: prior art references do not teach or render obvious a ferroelectric memory device having all elements arranged as claimed in claim 1, claim 6, claim 18, claim 50 and claim 52.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F. Tran whose telephone number is (571) 272-

Art Unit: 2811

1665. The examiner can normally be reached on 8:30AM - 5:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tt
September 28, 2005


THIENTRAN
PRIMARY EXAMINER

FIG. 2

